

**WHAT IS CLAIMED IS:**

1. An ink jet ink composition comprising water, a humectant, and a hyperbranched polymeric dye comprising a hyperbranched polymer having a dye chromophore pendant on the polymer chain or incorporated into the polymer backbone.

2. The composition of Claim 1 wherein said hyperbranched polymer having a dye chromophore pendant on the polymer chain has the formula:



wherein:

HB is a hyperbranched polymer core;  
D is a dye moiety; and  
n is an integer of at least 2.

3. The composition of Claim 2 wherein said HB is a polyamide, polyester, polyether, vinylic polymer, polyimine, polysiloxane, polyesteramide or polyurethane.

4. The composition of Claim 2 wherein said HB is prepared by a chain polymerization of a monomer of the formula  $M^1-R^1-M^2_m$  wherein (i)  $R^1$  is a linear or branched alkyl, carbonyl, or aromatic moiety; (ii),  $M^1$  and  $M^2$  are reactive groups that react independently of each other in which  $M^1$  is a polymerization group and  $M^2$  is a precursor of a moiety  $M^{2*}$  which initiates the polymerization of  $M^1$  as a result of being activated; and (iii), m is an integer of at least 1.

5. The composition of Claim 2 wherein said HB is prepared by a condensation or addition polymerization of a monomer of the formula  $M^3-R^2-M^4_p$

wherein (i)  $R^2$  is a linear or branched alkyl or aromatic moiety; (ii),  $M^3$  and  $M^4$  are groups that undergo a condensation or addition reaction; and (iii),  $p$  is an integer of at least 2.

5                    6. The composition of Claim 2 wherein said HB is prepared by a condensation or addition polymerization of a monomer of the formula  $R^2-M^5_q$  and  $R^3-M^6_t$ , wherein (i)  $R^2$  is as defined above and  $R^3$  is a linear or branched alkyl or aromatic moiety; (ii),  $M^5$  and  $M^6$  are groups that undergo a condensation or addition reaction; and (iii),  $q$  is an integer of at least 2 and  $t$  an integer of at least

10    3.

7. The composition of Claim 4 wherein  $M^1$  is a non-substituted or substituted vinylic group,  $M^2$  is X,  $-CH_2X$  or  $-CH(CH_3)X$  wherein X is Cl, Br, I, S-C(=S),  $YR^4R^5$  or  $-O-NR^4R^5$ ,  $Y=O$  or N, and  $R^4$  and  $R^5$  are each independently  $-(CH_2)_r$  ( $r = 1-12$ ),  $-C_6H_5$ ,  $-C(O)O$ , or  $C(O)$ .

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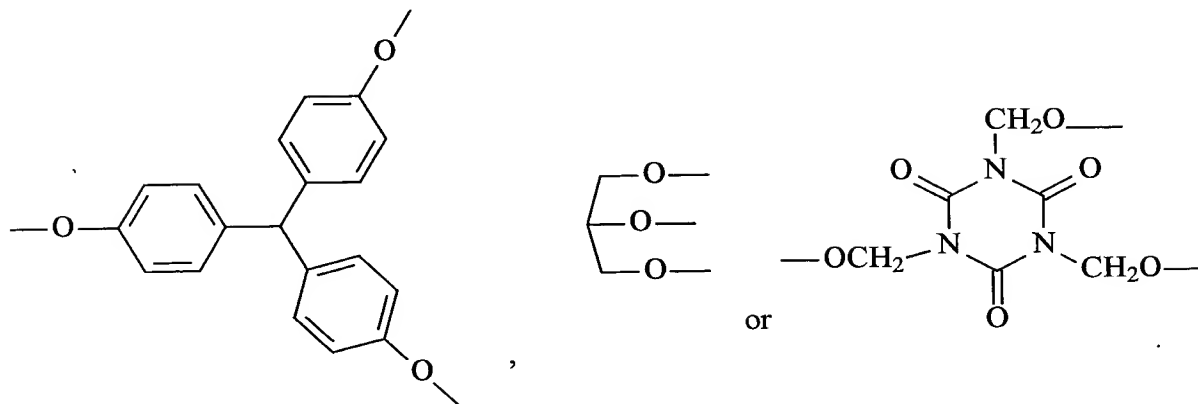
8. The composition of Claim 5 wherein  $M^3$  and  $M^4$  are each independently  $-COOH$ ,  $-OH$ ,  $-C(O)Cl$ , epoxy, anhydride,  $NH$ , or  $NH_2$ , and  $R^2$  is  $-C_6H_3-$ , or  $-(CH_2)_s-C(R^6)-$  wherein  $R^6$  is a linear or branched alkyl or aromatic group and  $s$  is an integer of 1-14.

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9. The composition of Claim 6 wherein  $M^5$  and  $M^6$  are each independently  $-COOH$ ,  $-OH$ ,  $-C(O)Cl$ , epoxy, anhydride,  $NH$  or  $NH_2$ , and  $R^3$  is

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$-\text{C}_6\text{H}_4-$ ,  $-\text{C}_6\text{H}_4-\text{O}-\text{C}_6\text{H}_4-$ ,  $-\text{C}_6\text{H}_3$ ,  $\text{N}(\text{CH}_2)_3-$ ,  $-\text{C}_4\text{H}_8-$ ,  $-\text{C}_6\text{H}_{10}-$ ,



5                    10. The composition of Claim 1 wherein said hyperbranched polymer having a dye chromophore incorporated into the backbone thereof is a polyamide, polyester, polyether, vinylic polymer, polyimine, polyesteramide or polyurethane.

10                   11. The composition of Claim 1 wherein said hyperbranched polymer having a dye chromophore incorporated into the polymer backbone is prepared by a chain polymerization of a monomer of the formula  $\text{M}^1-\text{R}^7-\text{M}^2_m$  wherein  $\text{R}^7$  is a linear or branched alkyl, carbonyl, or aromatic moiety containing a dye chromophore and  $\text{M}^1$ ,  $\text{M}^2$  and  $m$  are defined as in Claim 4.

15                   12. The composition of Claim 1 wherein said hyperbranched polymer having a dye chromophore incorporated into the polymer backbone is prepared by a condensation or addition polymerization of a monomer of the formula  $\text{M}^3-\text{R}^7-\text{M}^4_p$  wherein  $\text{R}^7$  is defined in Claim 11 and  $\text{M}^3$ ,  $\text{M}^4$  and  $p$  are defined as in Claim 5.

20                   13. The composition of Claim 1 wherein said hyperbranched polymer having a dye chromophore incorporated into the polymer backbone is prepared by a condensation or addition polymerization of a monomer of the

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formula  $R^8-M^5_q$  and  $R^9-M^6_t$ , wherein  $R^8$  and  $R^9$  are each independently a linear or branched alkyl or aromatic moiety, at least one of which contains a dye chromophore, and  $M^5$ ,  $M^6$ ,  $q$  and  $t$  are defined as in Claim 6.

5                    14. The composition of Claim 1 wherein said dye chromophore is a mono- or poly-azo dye, basic dye, phthalocyanine dye, methine or polymethine dye, merocyanine dye, azamethine dye, quinophthalone dye, thiazine dye, oxazine dye, anthraquinone or metal-complex dye.

10                   15. The composition of Claim 14 wherein said mono- or poly-azo dye is a pyrazoleazoindole.

15                   16. The composition of Claim 14 wherein said metal-complex dye is a transition metal complex of an 8-heterocyclazo-5-hydroxyquinoline.

17. The composition of Claim 1 wherein said humectant is diethylene glycol, glycerol or diethylene glycol monobutylether.

20                   18. The composition of Claim 1 wherein said hyperbranched polymeric dye comprises about 0.2 to about 20 % by weight of said ink jet ink composition.

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